SECTION 2

LIMITATIONS

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SECTION 2

LIMITATIONS

GENERAL

This section includes operating limitations, instrument markings, and basic placards required for safe operation of the helicopter, its engine, and other standard systems. This helicopter is approved as a normal category rotorcraft under FAA Type Certificate No. R00015LA as Model R66.

COLOR CODE FOR INSTRUMENT MARKINGS

Red  Operating limit. Edge of red line indicates limit. Pointer should not enter red during normal operation.

Red Cross-Hatch   Power-off $V_{ne}$.

Yellow  Precautionary or special operating procedure range.

Green   Normal operating range.

AIRSPEED LIMITS

NEVER-EXCEED AIRSPEED ($V_{ne}$)

2200 lb (998 kg) TOGW or above 130 KIAS

Below 2200 lb (998 kg) TOGW 140 KIAS

Autorotation 100 KIAS

For $V_{ne}$ reductions with altitude and temperature, see placards on page 2-10.

ADDITIONAL AIRSPEED LIMITS

65 KIAS maximum above 83% torque.

100 KIAS maximum with any combination of cabin doors removed.
ROTOR SPEED LIMITS

<table>
<thead>
<tr>
<th></th>
<th>TACHOMETER READING</th>
<th>ACTUAL RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power On</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum continuous</td>
<td>101%</td>
<td>412</td>
</tr>
<tr>
<td>Minimum continuous</td>
<td>99%</td>
<td>404</td>
</tr>
<tr>
<td><strong>Power Off</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>106%</td>
<td>432</td>
</tr>
<tr>
<td>Minimum</td>
<td>88%</td>
<td>359</td>
</tr>
</tbody>
</table>

POWERPLANT LIMITATIONS

ENGINE

One Rolls-Royce Model 250-C300/A1

OPERATING LIMITS

Gas generator speed (N₁)
- Maximum 105% (53,519 RPM)

Output shaft speed (N₂)
- Maximum continuous 101% (6076 RPM)
- Minimum continuous power on 99% (5956 RPM)
- Maximum transient overspeed* 106% (6377 RPM)

Measured Gas Temperature
- Maximum during start 927 °C (10 second limit above 782 °C)
- Maximum operating 782 °C (5 minutes)
  706 °C (continuous)

Torque
- 5 minute limit 100% (236 lb-ft)
- Continuous limit 83% (196 lb-ft)

* Avoid large, rapid power changes. The engine governor reacts slowly and RPM excursions may occur. Intentional operation outside continuous RPM limits is prohibited. Should an inadvertent excursion occur, the transient limit applies.
POWERPLANT LIMITATIONS (cont’d)

OPERATING LIMITS (cont’d)

Oil Temperature, Maximum 107°C

Oil Pressure
  Maximum during start and warm up 150 psi
  Maximum operating 130 psi
  Minimum above 94% N1 115 psi
  Minimum below 78% N1 50 psi
  Minimum from 78% to 94% N1 90 psi

Oil Quantity, minimum for takeoff 4 qt (3.8 liters)

WEIGHT LIMITS

Maximum gross weight 2700 lb (1225 kg)
Minimum gross weight 1400 lb (635 kg)
Maximum per seat
  including under-seat compartment 300 lb (136 kg)
Maximum in any under-seat compartment 50 lb (23 kg)
Baggage Compartment
  Maximum distributed load 50 lb/ft^2 (244 kg/m^2)
  Maximum total load 300 lb (136 kg)

CENTER OF GRAVITY LIMITS

See figure on page 2-4. Reference datum is 100 inches forward of main rotor shaft centerline.

NOTE

With all doors installed and no load in baggage compartment, a solo pilot weight of 160 lb (73 kg) or greater will ensure CG within limits. For lower pilot weight, compute weight and balance; removable ballast may be required to obtain CG at or forward of aft limit. (See Loading Instructions in Section 6.)
CENTER OF GRAVITY LIMITS
FLIGHT AND MANEUVER LIMITATIONS

Aerobatic flight prohibited.

**CAUTION**

Abrupt control inputs may produce high fatigue stresses and cause catastrophic failure of a critical component.

Low-G cyclic pushovers prohibited.

**CAUTION**

A pushover (forward cyclic maneuver) performed from level flight or following a pull-up causes a low-G (near weightless) condition which can result in catastrophic loss of lateral control. To eliminate a low-G condition, immediately apply gentle aft cyclic. Should a right roll commence during a low-G condition, apply gentle aft cyclic to reload rotor before applying lateral cyclic to stop roll.

Maximum operating density altitude 14,000 feet.

Maximum operating altitude 9000 feet AGL to allow landing within 5 minutes in case of fire.

Closing throttle (twist grip) in flight prohibited above 10,000 feet density altitude to avoid possible engine flameout.

Closing throttle (twist grip) in flight prohibited with cabin heat ON to avoid possible engine flameout.

Minimum crew is one pilot in the right front seat. A flight instructor may act as pilot in command from the left front seat. Solo flight from right seat only.

Forward left seat belt must be buckled.

Operation up to 100 KIAS approved with any combination of cabin doors removed. All seat belts must be buckled and loose items in cabin must be properly secured during doors-off flight.

A functioning headset must be worn by each pilot.
KINDS OF OPERATION LIMITATIONS

VFR day and night operations are approved.

VFR operation at night is permitted only when landing, navigation, instrument, and anti-collision lights are operational. Orientation during night flight must be maintained by visual reference to ground objects illuminated solely by lights on the ground or adequate celestial illumination.

NOTE

There may be additional requirements in countries outside the United States.

ENVIRONMENTAL LIMITATIONS

Maximum ambient temperature for operation is ISA plus 35°C (ISA plus 63°F), limited to 50°C (122°F).

Minimum ambient temperature for operation is -40°C (-40°F) at all altitudes.

NOTE

See fuel limitations for temperature restrictions.

Flight in known icing conditions prohibited.

Engine anti-ice must be on for operation in visible moisture in ambient temperatures at or below 4°C (40°F).
FUEL LIMITATIONS

APPROVED FUEL GRADES

<table>
<thead>
<tr>
<th>Grade (Specification)</th>
<th>Operating Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet A or Jet A-1 (ASTM D 1655)</td>
<td>Anti-icing additive may be required (see below). Not approved for ambient temperatures below –32°C (–25°F).</td>
</tr>
<tr>
<td>Jet B (ASTM D 6615)</td>
<td>Anti-icing additive may be required (see below). Not approved for ambient temperatures above 32°C (90°F) at altitudes above 5000 feet.</td>
</tr>
<tr>
<td>JP-4 (MIL-DTL-5624)</td>
<td>Not approved for ambient temperatures above 32°C (90°F) at altitudes above 5000 feet.</td>
</tr>
<tr>
<td>No. 3 Jet Fuel (P.R. China GB 6537-2006)</td>
<td>Anti-icing additive may be required (see below). Not approved for ambient temperatures below –32°C (–25°F).</td>
</tr>
</tbody>
</table>

Anti-icing additive conforming to MIL-DTL-85470 must be added to Jet A, Jet A-1, Jet B, or No. 3 Jet Fuel when ambient temperature is below 4°C (40°F). Check with fuel supplier to determine if supply includes additive. If not, add per manufacturer’s instructions.

FUEL CAPACITY

Total capacity: 74.6 US gallons (282 liters)
Usable capacity: 73.6 US gallons (279 liters)
INSTRUMENT MARKINGS

NOTE

Red lines offset so instrument pointer should not enter red. See color code on page 2-1.

AIRSPEED INDICATOR

| Green arc | 0 to 110 KIAS |
| Yellow arc* | 110 to 140 KIAS |
| Red cross-hatch | 100 KIAS |
| Red Line | 140 KIAS |

*Earlier airspeed indicators without yellow arc must have the following placard adjacent:

**DO NOT EXCEED 110 KIAS EXCEPT IN SMOOTH AIR**

ROTOR TACHOMETER

| Lower red line | 88% |
| Green arc | 88 to 106% |
| Upper red line | 106% |

ENGINE TACHOMETER (N₂)

| Yellow arc | 75 to 88%** |
| Power on – transient operation only. (No restrictions during autorotation.) |
| Lower red line | 99% |
| Green arc | 99 to 101% |
| Upper red line | 101% |

**Earlier tachometers with yellow arc from 78 to 88% must have the following placard adjacent:

**TRANSIENT OPERATION ONLY 75–88% N₂ NO RESTRICTIONS DURING AUTOROTATION**

GAS PRODUCER TACHOMETER (N₁)

| Green arc | 60 to 105% |
| Red line | 105% |
| White triangle | 16% |

(Later tachometers. Recommended fuel ON during normal start)
INSTRUMENT MARKINGS (cont’d)

MEASURED GAS TEMPERATURE
- Green arc: 150 to 706°C
- Yellow arc (5 minute limit): 706 to 782°C
- Red line: 782°C
- Red dot (start limit): 927°C

ENGINE OIL TEMPERATURE
- Green arc: 0 to 107°C
- Red Line: 107°C

ENGINE OIL PRESSURE
- Lower red line: 50 psi
- Yellow arc (below 78% N₁): 50 to 90 psi
- Green arc: 90 to 130 psi
- Yellow arc (start and warm up): 130 to 150 psi
- Upper red line: 150 psi

TORQUE
- Green arc: 0 to 83%
- Yellow arc (5 minute limit): 83 to 100%
- Red line: 100%

AMMETER
- Green arc: 0 to 160 amps
- Red line: 160 amps
### PLACARDS

Adjacent to pilot’s cyclic grip:

<table>
<thead>
<tr>
<th>PRESS ALT-FT</th>
<th>OAT - °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-40 -30 -20 -10 0 10 20 30 40 50</td>
</tr>
<tr>
<td>SL 2000</td>
<td>124 130 129 126 122 122</td>
</tr>
<tr>
<td>4000</td>
<td>119 127 129 125 121 117 113 108</td>
</tr>
<tr>
<td>6000</td>
<td>114 122 125 121 117 113 108 108</td>
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<tr>
<td>8000</td>
<td>109 117 121 116 112 107 102 97</td>
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<tr>
<td>10000</td>
<td>105 112 112 106 101 96 91 86</td>
</tr>
<tr>
<td>12000</td>
<td>100 106 101 95 90</td>
</tr>
<tr>
<td>14000</td>
<td>96 95 89</td>
</tr>
<tr>
<td>16000</td>
<td>90</td>
</tr>
</tbody>
</table>

**POWER-ON V_{ne} - KIAS**

**BELOW 2200 LB (998 KG) TOGW, ADD 10 KIAS**

**NOTE:** 65 KIAS MAXIMUM ABOVE 83% TORQUE

### Autorotation V_{ne} - KIAS

<table>
<thead>
<tr>
<th>PRESS ALT-FT</th>
<th>OAT - °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-40 -30 -20 -10 0 10 20 30 40 50</td>
</tr>
<tr>
<td>6000</td>
<td>100</td>
</tr>
<tr>
<td>8000</td>
<td>98 93 89 84 83 78</td>
</tr>
<tr>
<td>10000</td>
<td>98 93 88 83 78</td>
</tr>
<tr>
<td>12000</td>
<td>98 93 87 82</td>
</tr>
<tr>
<td>14000</td>
<td>93 87 81</td>
</tr>
<tr>
<td>16000</td>
<td>82</td>
</tr>
</tbody>
</table>

Near fuel tank filler cap:

**FUEL**

GRADE JET A, JET A1, JET B

OR AS SPECIFIED IN PILOT’S HANDBOOK

ANTI-ICE ADDITIVE MAY BE REQUIRED

SEE PILOT’S HANDBOOK
PLACARDS (cont’d)

Near fuel gage:

73.6 US GAL
279 LITERS

In clear view of pilot:

SEE PILOT’S HANDBOOK FOR SOLO PILOT WEIGHT LESS THAN 160 LB (73 KG)

THIS ROTORCRAFT APPROVED FOR DAY AND NIGHT VFR OPERATIONS

LOW-G PUSHOVERS PROHIBITED

On removable cyclic grip:

SOLO FROM RIGHT SEAT ONLY

On or near collective controls:

NO STOWAGE KEEP AREA CLEAR

In clear view of all occupants:

NO SMOKING

Inside cabin above each cabin door:

EXIT

Inside each cabin door near door handle:

TO CLOSE: SLIDE HANDLE AFT AND DOWN
TO OPEN: LIFT HANDLE AND SLIDE FORWARD
PLACARDS (cont’d)

Near lock on rear cabin doors:

PUSH TO LOCK
DO NOT LOCK IN FLIGHT

Inside each under-seat compartment:

**CAUTION**

DO NOT EXCEED THE FOLLOWING:
- COMPARTMENT CAPACITY: 50 LB (23 KG)
- COMBINED SEAT PLUS COMPARTMENT: 300 LB (136 KG)
- MAX FILL LINE

SEE PILOT’S HANDBOOK FOR ADDITIONAL LOADING INSTRUCTIONS.

Inside main baggage compartment:

**CAUTION**

- MAXIMUM DISTRIBUTED FLOOR LOAD: 50 LB/FT² (244 KG/M²)
- MAXIMUM TOTAL COMPARTMENT LOAD: 300 LB (136 KG)